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ISEDJ is published online (http://isedjorg) in connection with ISECON, the Information Systems Education Conference, which is also double-blind peer reviewed. Our sister publication, the Proceedings of ISECON (http://isecon.org) features all papers, panels, workshops, and presentations from the conference.

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Editors

Teaching Case

Real time locations systems or outsourcing: A case study

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Abstract

Information Technology has transformed almost all aspects of modern healthcare and is playing a vital role in the administration of hospitals around the world. This case study examines one hospital's struggle to solve crucial operational problems related to the efficient management of medical equipment inventory. This case study is the result of studying the issues facing a regional medical center in the western United States and is based on an actual set of events. This case focuses on one hospital's decision between deploying a sophisticated information system in the form of a Real Time Location System, or outsourcing these activities to a specialist company. All identifying information has been changed to protect the privacy of all parties involved.

Case Summary:
A large regional medical center in the western United States is struggling. A consulting firm hired to examine the hospital's operating procedures revealed that the hospital was suffering from terrible inefficiencies costing the hospital millions. In addition to the financial costs, the hospital was also exposed to legal liabilities because important medical equipment maintenance activities were not being conducted. The new CEO took immediate action to understand the full extent of the problem and, based upon advice from his leadership team, to identify a solution. The CEO and his team had a difficult choice between investing in more technology or outsourcing important hospital activities.

Keywords: Information Technology, Real Time Location System, Process Improvement, Outsourcing, Health Informatics

1. INTRODUCTION

Six months ago Mike Smith assumed the CEO position at St. Francis Hospital, the region's largest health care center. Mike is a seasoned healthcare executive, with 24 years of hospital administration experience. In the healthcare industry he has developed a national reputation as a turnaround specialist focusing on hospital systems in financial difficulty. Accordingly, Mike was recruited to run St. Francis in the hope that he might improve the struggling hospital's performance and profitability.

This particular morning Mike looked tense and troubled. None on the hospital's staff could know what was troubling him as he had just received the confidential report from the consulting firm Premier, Inc. Premier is a leading consulting firm in the healthcare industry. Mike has worked with Premier over the years and has found the firm's work to be first rate.   Premier's approach focuses on using statistical process control techniques to analyze and improve organizational processes. Their techniques and methods are considered to be the highest standard in the field. While Mike knew the hospital had issues he was stunned to learn about the terrible operational inefficiencies unearthed by the consulting team.

Based on the report it was clear to Mike that the operational problems were not isolated to financial issues, but also extended into liabilities associated with not following important compliance procedures that are critical to patients' care. If the hospital failed to correct these issues it could result in the loss of its accreditation. As Mike set the confidential report back on his desk his cellphone rang. It was Kim Huntington, the CEO of Providence Healthcare Services, which owns St. Francis and other hospitals. Mike knew that Kim must have just finished reading the same document he had and he knew she would want to know what he planned on doing to fix the problems.

2. ORGANIZATION'S HISTORY

St. Francis Hospital was founded in 1873 by the sponsorship of the Catholic Healthcare Missionary Group. As a non-profit healthcare provider, the hospital is committed to providing for the needs of the community it serves, especially the poor and vulnerable. St. Francis's primary facility consists of a seven-story building with over 400 beds to accommodate inpatient care. In 2007 the hospital completed a major reconstruction effort that substantially upgraded the facilities. The hospital is able to provide a wide array of surgical services and, because of the quality of the community in which the hospital is located coupled with the new facility, is able to attract high quality nurses and physicians onto its staff.

In fact, in 2009 the hospital received a national award recognizing excellence in its trauma facility. The facility is supported by two helicopters that deliver trauma patients from across the region. Because of the diverse services St. Francis provides, the trauma facility is a critical component of the region's healthcare system.

However, the hospital's "crown jewel" is its Heart Institute, which is regularly recognized as one of the top 100 in the world. This is an unusual distinction for a hospital like St. Francis, as most of the other top cardiac facilities are associated with research hospitals across the globe. The Heart Institute was founded in 1994 when a team of leading cardiac surgeons elected to leave a major research hospital in the northeast and move to St. Francis to try to build a world renowned institute in a location that could provide the physicians and their families a better quality of life.

In 2010, St. Francis' board of directors made a major decision: for the first time since 1873 the hospital would not be an independent medical facility. The board decided to join a large health care system called Providence Healthcare Services (Providence). This decision was made in response to changing industry dynamics that favor larger integrated organizations (Harris, 2000). This change represented a significant departure from the hospital's history, and many of the staff struggled with the idea that the hospital is but one entity in a much larger healthcare organization.

Providence Health includes 27 hospitals, 214 smaller clinics and 42 geriatric assisted living facilities. In addition, Providence contracts with 7 universities to provide on-campus health services to their student populations. Providence's assets span six states: Alaska, California, Idaho, Montana, Oregon and Washington; the organization's headquarters are located in Seattle, Washington. The board was motivated to merge with Providence because of the significant efficiency benefits the

organization would accrue. In addition to the efficiency benefits associated with greater scale, the board also hoped that Providence would help St. Francis modernize its technology.

The modernization of St. Francis's technical infrastructure began almost immediately following the merger with Providence through the implementation of a cloud-based Electronic Health Record System (EHRS). Because of Providence's size and scale, they were able to implement the cutting edge cloud-based EHRS and deploy it to all of its affiliates. This provided significant benefits as Providence staff could centrally manage the EHRS and the IT staff in the member hospitals could focus on providing better service and working on local initiatives. Almost everyone in the hospital agreed that it represented a significant improvement. The physicians were the most vocal in their support because the cloud-based system allowed them to securely access patient records from almost any approved device.

During the implementation of the cloud-based EMRS, it became clear that the project management skills of the St. Francis staff were not at the level they should be. For example, Mark Nesbit, the previous CIO and a long-time St. Francis employee (it was the only job he had had since college), was lacking the skills to keep up with the more advanced systems employed by Providence and was accordingly encouraged to retire. He was replaced by Sarah Thompson, the assistant CIO in one of Providence's Oregon hospitals. Sarah brought a thorough understanding of Providence's cloud-based EMRS and first-rate credentials. In addition to holding an MIS degree, she is certified by the Project Management Institute (PMI) as a Certified Project Management Professional (PMP).

3. THE MEETING

Upon finishing the call with Kim Huntington, the CEO of Providence Health Care Systems, Mike sent out an email to his executive team calling for an emergency meeting the next morning and instructing them to clear their schedules for the first half of the day. He attached the report critical of St. Francis's operations to the message and asked the executive team to thoroughly read the report and to show up with solutions.

The next morning all of the members of the executive team were present. The atmosphere was tense, as everyone in the room knew that solving the problems would inevitably require them to bring to the surface some of the tensions between the long-time St. Francis's employees and the new guard brought in after the merger of St. Francis's and Providence.

Mike called the meeting to order and summarized the findings of the report. Based upon Premier's analysis, St. Francis received a 'D' grade in the area of staff efficiency. Furthermore, the report stated that the inefficient use of medical staff time was costing the hospital millions and exposing it to malpractice risk. The report highlighted in devastating detail how nurses throughout most of St. Francis were spending 23 percent more time per patient than was the average hospital. In addition, the time the nurses were spending was not a result of providing quality care, but instead was consumed by incredible logistical inefficiencies. Due to poor inventory control and tracking procedures, important medical equipment was either not in the stock rooms or was restocked slowly. In short, the report revealed the nursing staff was spending a startling amount of time looking for the required equipment instead of treating patients. As a response to such inefficient inventory management practices, nursing staff would hoard important equipment, further complicating matters.

Required maintenance on critical medical equipment was also poorly documented and, in some cases, being skipped entirely because of substandard medical equipment management practices. If the hospital were sued for malpractice, the deficient maintenance processes would not only be embarrassing to St. Francis's reputation, they could also serve as the basis for a successful judgment against the hospital.

Following the summary, Mike asked the team what they thought of the findings. The first reaction was to dismiss the report as the work of people who come in for a few days and leave without really understanding the organization or its processes. Mike quickly dismissed this critique, as he had worked with Premier over the years and found them to be an outstanding firm. He stated, "We aren't going to sit around here and kill the messenger. This report has pointed out that we have real problems and we are here to fix them.

"Many of you are still getting to know me, but you should know me well enough to know that I value your candid assessment. I encourage all of you to speak your mind, but please be respectful and operate in a spirit of positive problem solving and not one of blame. I understand that much has changed around here over the last few years, but we must come together so that we can continue to enable one of the noblest goals in our society and that is helping sick people get better. Remember, our goal is to not defend our turf, but to help sick people. Now, who wants to speak?"

The first person to speak was Kelly Andrews, the Director of Nursing Services for St. Francis. Kelly is considered to be a quiet professional and has spent her entire career with the hospital. She attended the local university and was the first person in her family to earn a college degree. With tears welling up in her eyes she stated that she thought that the problems identified in the report were actually worse than the report revealed. While the report focused on the economic effects of the failings in the existing system, she stated that from her perspective the morale issues were much worse. She said that the nursing staff were demoralized by the existing system and that the issue had been pointed out for several years. In fact, Kelly had spoken with the previous CEO on several occasions about her concern. Mike's predecessor simply stated that steps would be taken to fix the problems, but she and the nursing staff needed to be patient. After hearing this, Mike stated, "this mistake will not happen again and you can rest assured that this issue is going to be resolved. Please convey to the nursing staff that this is our top priority and we will need their help in solving the problem."

By this time everyone on the staff recognized the significance and legitimacy of the problem and Mike continued to push for solutions. After a few hours of discussion the members of the executive team were evenly split between one of two solutions. The first, an idea championed by Sarah Thomson the CIO, was a technical solution that focused on using Real Time Location Services (RTLS) to monitor the location of equipment. The second solution was supported by George Hill, the Central Stores and Distribution Manager. He strongly advocated for outsourcing the equipment maintenance and management to a company the hospital has been working with through the years.

Solution 1: RTLS

The solution supported by the CIO was the result of her previous experience at another hospital that used RTLS to improve operational efficiencies. RTLS, "which combine radio frequency ID (RFID) and Wi-Fi, will allow for real-time data gathering and live asset tracking. RTLS can calculate distances, range, time or direction in order to determine the location of objects, and is capable of providing stored data that can be used for analysis and reporting" (Okoniewska, 2012). When RTLS are employed in an organization, each piece of equipment is embedded with an RFID chip. When the piece of equipment is moved its location is known at all times. The information can then be linked to medical records systems such as those used by St. Francis. Furthermore, it is widely recognized in the hospital administration community that the data derived from RTLS can be used to rationalize and "transform hospital processes" (Carrasco, 2010).

Solution 2: Outsourcing

George Hill, who has over twenty years of experience at St. Francis and is considered to be the leader of the old guard, favored outsourcing all inventory control and maintenance to a third party. Five years ago, George was instrumental in working with a local company, Drothall Hospital Services, to outsource all of St. Francis's janitorial services; this had largely been viewed as a success. He suggested that with its proven track record with the hospital, Drothell is well positioned to assume procurement, inventory management and all medical equipment maintenance for St. Francis. In addition, Drothall would hire most of the St. Francis staff currently working in this area of the hospital, thereby reducing payroll considerably. George concluded by saying that outsourcing, coupled with process improvement, could effectively solve the problems currently faced by the hospital. Furthermore, while the transferring of some St. Francis staff to Drothall would be controversial, the savings would be an added benefit to the efficiency and profitability of St. Francis.

After several hours of discussion, Mike challenged both Sarah and George to investigate the advantages and disadvantages of employing RTLS and outsourcing. He concluded the meeting by giving Sarah and George one week to research and develop the business case

around their respective ideas. He set the next meeting for exactly one week later and asked them both to prepare presentations to be given to the entire executive committee.

4. MAKING THE CASE:
RTLS OR OUTSOURCING?

The presentation day quickly came and all members of the executive team were assembled. Both Sarah and George came prepared with presentations to represent their respective solutions.

REAL TIME LOCATION SYSTEM

Sarah began the meeting by emphasizing how healthcare organizations are investing significant resources into IT infrastructure for the purpose of improving medical service delivery, operational efficiency and to ensure regulatory compliance (Medpac, 2004). In addition, Sarah recognized that "IT continues to hold more potential for providing competitive advantage for health care providers" (Carr, 2004). Additionally, St. Francis could leverage the hospital's existing Cisco Systems WiFi infrastructure by using WiFi based RTLS technology. WiFi based RTLS delivers room level accuracy of medical equipment and other operational resources.

Benefits of RTLS

The main reasons for investing and implementing the WiFi RTLS were:

1. RTLS would significantly reduce the time required to search for and identify equipment that is due for regular maintenance. St Francis's has already invested in a maintenance tracking system that is a cloud-based system that tracks the maintenance requirements for critical medical equipment. Sarah's research revealed that the RTLS system being considered was interoperable with the maintenance scheduling system. This is a critical activity in that it is important for hospitals to demonstrate to accrediting bodies that they are compliant with the processes and procedures identified by the *Healthcare Compliance Accreditation Group*, an important governing body.

2. RTLS will reduce total expenditures by reducing costs associated with renting additional equipment due to shrinkage or hoarding by clinical staff. The WiFi based RTLS technology is able to penetrate through barriers like walls and lockers to identify hidden equipment.

3. RTLS would reduce inventory count and relocating time. The system displays the exact location of all equipment, which can be displayed from several different views such as the entire hospital, all the way down to an individual room. By knowing the exact location of a required piece of equipment, hospital staff are far more efficient. This would have the effect of lowering costs and improving the effectiveness of hospital staff as they will no longer have to wander through the hospital looking for a piece of equipment. This would have the added benefit of improving staff morale.

4. RTLS would improve nurse and patient tracking capabilities as well as St. Francis's Business Intelligence initiatives. Because the RTLS interfaces seamlessly with the hospital's EMR, the hospital's employees would be able to view patients' and clinicians' movements on the wall monitors displayed throughout the hospital. Thus, results stored in the databases could be used to monitor trends and could be analyzed to identify operational activities that can be improved. Sarah related an incident where a hospital at which she previously worked used RTLS to avoid a legal judgment from a patient who alleged that a nurse had assaulted her. By using the employee tracking aspect of RTLS, the hospital was able to prove that the employee was inside the patient's room for a total of three minutes and that other members of staff were in close proximity, thereby proving the assault did not happen.

Disadvantages of RTLS

In spite of the promises from various RTLS vendors, the implementation and full use of the system had sometimes fallen short of expectations.

1. The costs associated with implementing an RTLS can be high and hospital administrators have observed that in some instances other components of the infrastructure including hardware and software had to be updated for proper implementation.

2. A few hospitals reported issues during the implementation of RTLS that compromised operations. Hospital staff in the affected hospitals blamed the company hired to implement the system and it was believed the vendor did not have sufficient project management expertise.

3. In order to properly use the system, the hospital would have to develop and deploy a new training program for hospital staff so that the powerful feature set within the RTLS could be used. It was noted that these types of training programs are both expensive and require the time of an already overworked staff.

4. In order to effectively deploy RTLS, issues affecting signal strength throughout the proposed environment must be considered. One concern involved the areas of the hospital that provide magnetic resonance imaging (MRI) services. These areas are known to be "a major source of electromagnetic interference at the hospital" (Cheng, 2011). Some evidence suggests that there can be blurred images in areas where RFID is used. However, the WiFi-based RTLS technology being considered had not been linked to such interferences.

5. It is estimated that the IT department would need to hire an additional person, thereby increasing the number of full time IT staff.

OUTSOURCING

George also came prepared with a full presentation outlining the argument for outsourcing. He stated that he is in favor outsourcing as it could complement the broader strategy at St. Francis. He opened his presentation by stating, "Strategic outsourcing is the decision to allow one or more of a company's value chain activities or functions to be performed by independent specialist companies that focus all their skills and knowledge on just one kind of activity" (Hill, 2010). Strategically, he supported outsourcing all the medical equipment services to a specialist firm with experience in providing healthcare support services.

Benefits of Outsourcing

George said that the primary reasons for outsourcing are:

1. Outsourcing would significantly reduce the costs of doing business because specialist firms are far more efficient than internal departments. George noted that Gartner Inc. estimates that "health care organizations save an average of about 23 percent on outsourcing contracts, including IT and non-IT outsourcing, with some organizations seeing savings up to 45 percent on some outsourcing contracts" (Gross, 2004).

2. Outsourcing would improve service quality delivery. By outsourcing noncore activities, the hospital can focus its energies on core activities and deliver better quality healthcare services to patients.

3. Outsourcing would improve the speed of adopting new technology geared toward integrated health IT infrastructure. George noted that research has shown that "IT outsourcing is a harbinger of the transformation of traditional IT departments and provides a glimpse at the emerging organizational structures of the information economy" (Lacity, 1998). In addition, specialist firms are better suited to stay on top of emerging trends and technologies.

    4. George concluded with an emotional appeal for St. Francis to focus on what it does best, which is providing invaluable health services to the community. By "outsourcing materials supply, the hospital benefits by lowering its cost structure, which allows it to focus on its distinctive competencies. This is vital to its long-term competitive advantage and profitability as well as increasing product differentiation" (Hill, 2010).

Disadvantages of outsourcing

However, it is important to recognize the downside of outsourcing healthcare services, namely, "risks such as holdup and possible loss of important information when an activity is outsourced" (Hill, 2010).

1. One downside of outsourcing, observed across industries, relates to a loss of quality control in the outsourced

function. When control is shifted to a third party it can sometimes be difficult to quickly remedy quality problems.

2. In the healthcare environment losing patients' personal information may result in penalties as a consequence of violating the Health Insurance Portability and Accountability Act (HIPAA). HIPAA requirements mandate healthcare organizations to follow strict procedures in order to protect the privacy and security of the patient records within the hospital's care (HHS, 1996a and 1996b).

3. Another problem with outsourcing is that sometimes when "companies sign long-term [outsourcing] contracts they lose control of their IT assets and capabilities" (Lacity, 1998). Therefore companies that outsource functions lose autonomy to the outsourcing specialist.

4. It has been observed by critics of outsourcing that there are often hidden costs associated with outsourcing and that scope creep can severely affect total costs.

5. CONCLUSION

Two weeks later Mike called a meeting with Sarah, George, and the executive team to announce his decision. After consulting with Providence staff and other hospital CEOs he has decided to go with the RTLS solution. He asked Sarah and George to co-chair a subcommittee that would develop an implementation plan. George questioned whether or not he was the right person to co-chair an initiative he didn't support. Mike stated that George's expertise and institutional memory would be a valuable contribution toward the project's success.

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APPENDIX A: STUDENT ASSIGNMENT

You have been hired by a hospital that is considering solutions to the same problems encountered at St. Francis. Please consider the following questions and prepare a 15 minute presentation. Your presentation should address the following questions.

1. What are additional strengths and weaknesses of either RTLS or Outsourcing?

2. What important components (sponsors, stakeholders, project management, roles and responsibilities) of RTLS and Outsourcing implementation project would you suggest? Who should be involved in the project from these various stakeholders, and why?

3. Identify tangible business benefits for all relevant departments of either RTLS or outsourcing.

4. What processes and methodologies would you employ to select the appropriate system? What sort of information would you require to make accurate projections for the costs and benefits associated with this system?

5. Early in the case it was revealed Sarah holds the PMP designation. What is this designation? What type of skills are required to earn this certification?